

Uninformed Search

- 1) (Thanks to Ariel Felner.) Three missionaries and three cannibals must cross a river from its left bank to its right bank using a boat which can carry at most two people, under the constraint that, for both banks, if there are missionaries present on the bank, they cannot be outnumbered by cannibals (if they were, the cannibals would eat the missionaries). The boat cannot cross the river by itself with no people on board. In addition, when a boat arrives at a destination bank then anyone inside the boat is considered to be on the destination bank (even if the boat returns to the other bank right away). How can the 6 people move without violating the constraint?
 - a) Express this problem as a state space as follows: Define the different states, define the different operators and their applicability (do not allow states that violate the constraints) and define the start and goal states.
 - b) How many different states are possible?
 - c) Write a shortest sequence of states (path in the state space) that will solve the problem.
- 2) A 4-neighbor gridworld is given below. In which order do depth-first search and breadth-first search (both with a sensible node pruning strategy) expand the cells when searching from s to g? Ties are broken in lexicographic order. That is, A1 is preferred over A2 and B1, and A2 is preferred over B1.

	A	B	C	D	E
1					s
2					
3	g				
4					
5					

- 3) Compare the advantages and disadvantages of breadth-first and depth-first search and discuss to which degree pruning of tree nodes is important for them.
- 4) Does depth-first search always terminate if there is a path of finite length from the start to the goal? Why?
- 5) In Manhattan, you want to reach a given destination from your current location with as few left turns as possible. Can this be formulated as finding a minimum cost path in a graph? If so, how? If not, why not?